To: Dr. Jerry Meral, CA Resources Agency
Cc: Dale Hoffman-Floerke, Department of Water Resources
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Maria Rea, National Marine Fisheries Service
Mike Chotkowski, U.S. Fish and Wildlife Service
Chuck Bonham, CA Dept. of Fish and Game
From: Dr. Jon Rosenfield, The Bay Institute
Date: February 9, 2012
Re: Preliminary Review of BDCP Effects Analysis Appendix F

These comments represent The Bay Institute's preliminary, abbreviated review of this document and do not purport to be a thorough and comprehensive critique. Rather, they reflect a deepening concern regarding the adequacy of the current analytical framework for the Plan and the bias evident in the execution of the analysis. We hope these comments will be useful in revising the Effects Analysis to construct a more sound foundation.

Appendix F (Ecological Effects) of the BDCP Effects Analysis ("EA") is inadequate for many of the same reasons that other Appendices of this EA and previous versions of the Conservation Strategy and EA have been inadequate. These foundational flaws, include:

- Failure to compare projected effects to pre-determined biological goals and objectives, a legally relevant or physically accurate set of baseline conditions, and actual recent historical conditions (each of which are necessary to any claim made by BDCP of a "contribution to species or ecosystem recovery");
- Failure to correctly identify stressors that currently prevent attainment of biological goals and objectives for each covered species and the ecosystem as a whole;
- Failure to quantify the amount of change in those stressors required to eliminate or partially alleviate those stressors as a means to attaining BDCP's Goals and Objectives;
- Failure to assess the likelihood and magnitude of conservation measure contribution to reducing key stressors, accounting for both intended positive and foreseeable negative impacts of these measures;
- Failure to identify the likely time-frame in which proposed conservation measures might contribute to stressor reduction, attainment of biological goals and objectives and overall project success;
- Failure to describe and list the assumptions that are central to the analysis and uncertainties inherent in the linkage between conservation measure, stressor reduction targets, and attainment of the biological objectives so that BDCP can address these assumptions and uncertainties in an well-defined adaptive management plan.

As a result of these shortcomings, Appendix F (like its predecessors) does not produce accurate answers to relevant questions needed by state and federal decision-makers and the general public as they evaluate the BDCP. We maintain that this failure occurs because the BDCP process still has not implemented the Logic Chain planning architecture or any other valid approach to planning such a large and complex process. Any one of the above flaws would be cause for serious concern with the Effects Analysis– taken together, they result in a fatally flawed and unusable product.

In addition to the lack of acceptable structures and processes for developing the EA and plan proponents' refusal to use the analysis iteratively, in a scientifically credible and rigorous process to develop a refined Conservation Strategy, Appendix F lacks the objectivity, transparency, rigor, internal consistency, or depth of scientific understanding to make a positive contribution to BDCP's EA. Appendix F is unacceptable because it:

- Omits descriptions of potentially major impacts to the covered species, ecosystem components, and/or stressors it purports to analyze;
- Fails to incorporate the best available science (i.e. it avoids the major findings of valid, peer-reviewed conceptual or quantitative models);
- Presents selective and misleading interpretation of analytical results, published, and unpublished literature in a manner that consistently promotes perceived project benefits while ignoring foreseeable negative impacts;
- Completely misrepresents the findings of some of the literature it references;
- Avoids the evidence and best professional judgment of the great majority of experts regarding the primacy of fresh water flows in driving ecosystem process and covered species' population response in this ecosystem;
- Presents results in an internally inconsistent manner that is uniformly and favorably biased to the supposed positive impacts of the Conservation Strategy; and
- Fails to incorporate, acknowledge, or transparently respond to concerns raised by environmental NGO's, state and federal fish, wildlife, or water management agencies, or independent science reviews.

As noted in our previous comments, these same problems occur in other BDCP EA Appendices.

The problems described above (and documented below for Appendix F and in our previous comments on Appendices A, B, C, and D) are too numerous and foundational to "fix" by simply editing or tweaking the documents. Their presence in the public realm can only serve to increase confusion and misinformation about BDCP and its likely effects; as written and structured, these appendices will ultimately erode the BDCP's credibility and the credibility of the Resources Agency. Thus, we strongly urge you to withdraw the current EA appendices until the process for developing the conservation strategy and EA can be placed on the much more transparent, rigorous, and credible foundation established by the BDCP Logic Chain. We stand ready to assist in such a re-structuring of BDCP's technical components and their application towards development of a credible plan.

Below we document the various ways in which Appendix F fails to incorporate the best available science. Our review focuses on Appendix F's analysis of food web impacts expected to result from BDCP restoration efforts. This focus is justified because, as currently designed, BDCP's effects on food web dynamics are central to the Plan's overall effectiveness[1]. Also, there is

[1] As we described in our April 4, 2009 letter regarding the BDCP Conservation Strategy, he proposals for smelt hatcheries assessed in Appendix F are not valid conservation measures n the context of an ESA HCP or NCCP; we will not address them again here but do incorporate, by reference, our previous comments . We also do not address the analyses of impacts related to SAV removal or predator control, though we have no reason to expect that they are free of the problems apparent in the sections on food web effects.

simply too much wrong with this appendix and too little time available under BDCP's aggressive schedule to document and critique all sections of this Appendix.

- **Appendix F omits descriptions of potentially major negative impacts to the covered species, ecosystem components, and/or stressors it purports to analyze;**

In part, Appendix F purports to document the likely effect of the BDCP Conservation Strategy on the food supply available to covered species in the Delta. The principle mechanism offered by the Conservation Strategy for increasing food supply are a suite of shallow-water habitat restoration activities on the Yolo Bypass, the Cache Slough Restoration Opportunity Area (ROA), the Mokelumne/Cosumnes ROA, South Delta ROA, West Delta ROA, and Suisun Marsh ROA.

The Appendix does not address what we would expect to be potential negative impacts to the food chain of the BDCP operational regime arising from (1) decreased fresh water flows into, through, and out of the Delta; (2) increased export of water and food items/organic matter in that water; or (3) changes in water quality that may occur as a result of exporting high-quality Sacramento River water from the system before it can dilute natural and human-produced toxins in the Delta (e.g. from San Joaquin Basin agricultural return flows). These omissions represent major gaps in the analysis, which are not addressed elsewhere. For example, the Flow Appendix does not describe the high-magnitude, significant, durable, positive correlation between fresh water Delta outflow and certain copepod species (*Arcatia* and *Eurytemora affinis*), shrimp (e.g. *Crangon* sp), longfin smelt, splittail, juvenile striped bass, and other species that serve as prey for some or all covered species[2] (e.g. Kimmerer 2002; Rosenfield and Baxter 2007; Rosenfield 2010; Kimmerer et al. 2009[3]). The EA Appendices reference many of the publications that identify the strong connection between fresh water flows and secondary productivity in this system and publications that relate to water quality and food production, so it is surprising that the EA is silent on the potential impact of flow reductions and water quality impacts on food production in this system, especially since increasing production of prey for the covered species is such a central focus of the BDCP Conservation Strategy.

- **Appendix F fails to incorporate the best available science (i.e. it avoids the major findings of valid, peer-reviewed conceptual or quantitative models);**

The Appendix ignores credible scientific information that would seem to contradict its pre-determined finding that these habitat restoration projects will benefit *all* of the covered species. For example:

1) As noted above, (a) numerous studies document the relationship between freshwater flow and food production in this system, (b) the potential to export food while increasing exports of water is obvious but this effect is not evaluated in the Entrainment Appendix, and (c) there

[2] In general, BDCP has not considered that production of fish species like longfin smelt, splittail, and striped bass may increase the food supply for those covered species with a piscivorous life history stage (e.g. steelhead, white sturgeon, green sturgeon)

[3] Where the EA's Appendices already refer to documents cited here, I have not provided the full citation. Please contact me if you would like a more complete citation.

has been much discussion (though little credible analysis) of the effect of toxins on food web productivity, but the EA Appendix dedicated to toxins does not evaluate their potential impact on food production in the Bay-Delta.

2) In 2010, during its independent review of the Delta smelt Biological Opinion, the National Research Council[4] expressed skepticism of the potential positive impact on Delta smelt of habitat restoration activities similar to those analyzed in Appendix F. They wrote:

> *"...the relationship between tidal habitat and food availability for smelt is poorly understood, and it is inadequate to support the details of the implementation of* [the BO's wetland habitat restoration action]... *The committee recommends that* [the tidal habitat restoration provisions of the Delta Smelt BO] *be implemented in phases, with the first phase to include the development of an implementation and adaptive management plan (similar to the approach used for the floodplain habitat action in the NMFS biological opinion), but also to explicitly consider the sustainability of the resulting habitats, especially those dependent on emergent vegetation, in the face of expected sea-level rise. In addition, there should be consideration of the types and amounts of tidal habitats necessary to produce the expected outcomes and how they can be achieved and sustained in the long term. More justification for the extent of the restoration is needed.*

This finding is not mentioned in Appendix F nor is there any new analysis that would contradict the NRC panel's skepticism.

3) Appendix F ignores the results of BDCP's own scientific review (the 2009 DRERIP reviews[5]) which assessed the likelihood and magnitude of projected positive and negative effects from actions identified in the conservation strategy, including the potential for tidal marshes to supplement food supplies for each of the covered species. These reviews were very critical of certain habitat restoration proposals and more hopeful for some of the proposed habitat elements; but this thorough analysis is largely ignored in Appendix F. For example, the current Appendix is optimistic about the potential benefits from restoration of tidal marsh habitats in the West Delta and South Delta, stating:

> *Restoration in the West Delta and South Delta ROAs is expected to increase local food production for rearing salmonids and splittail, and increase availability and production of food in the western Delta and Suisun Bay by export via tidal flow.*

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[4] National Research Council. 2010. A Scientific Assessment of Alternatives for Reducing Water Management Effects on Threatened and Endangered Fishes in California's Bay Delta. Committee on Sustainable Water and Environmental Management in the California Bay-Delta. 104 pp. http://www.nap.edu/catalog/12881.html

[5] In 2008 and 2009, BDCP convened numerous experts in the fish and ecosystem processes in the San Francisco Bay-Delta estuary to review proposed conservation measures (many of which are retained by the current BDCP). Over the course of many weeks, these experts applied a rigorous review methodology developed by the Delta Regional Ecosystem Restoration Implementation Program (DRERIP) of the California Department of Fish and Game. Findings of the reviews, which was imperfect and never concluded, are summarized here: http://science.calwater.ca.gov/pdf/workshops/workshop_eco_052209_BDCP-DRERIP_Summary_with_Appendices1.pdf

By contrast, the 2009 DRERIP review of the West Delta and South Delta restorations concluded [p.9]:

> [West Delta] *Results indicate that the effects of Egeria establishment and associated predation are potential medium to high magnitude negative outcomes, but certainty is low.* [This] *ROA is particularly limited by the fact that it consists of numerous, small, disconnected parcels.*

and

> *Benefits* [of the South Delta ROA] *considered minimal at best under current conveyance and export configuration.*

The authors of the EA have access to the full 2009 DRERIP review -- indeed, this is the first Appendix of the current EA to reference that review in any substantial way. Yet, the findings that many covered species would experience meager, if any, benefits from food produced on restored habitats or exported from them is not mentioned in Appendix F.

- **Appendix F presents selective and misleading interpretation of referenced literature in a manner that consistently promotes perceived project benefits while ignoring foreseeable negative impacts;**

In our April 4, 2011 review of the BDCP effects analysis, we wrote:

> *... the EA reads more like an advertisement for the project it analyzes rather than an objective analysis of highly uncertain outcomes.*

Unfortunately, this statement is still true of Appendix F and its predecessors. The Appendix repeatedly makes selective and/or grossly misleading references to the literature and previous BDCP reviews. In particular, the potential effects on covered species' food supply that are expected to arise from BDCP's habitat restoration projects have been reviewed numerous times, yet the Appendix ignores those very specific and thorough assessments (*see above*). At times, the EA misrepresents or distorts the findings of experienced researchers; at other times it invents findings that are flatly contradicted by the literature cited. A non-exhaustive set of examples follows:

1) Regarding the EA's working hypothesis regarding the benefits of tidal marsh restoration on the Bay-Delta food web, Appendix F states [F-48]:

> *Restoration of tidal wetlands has the potential to increase the availability and production of food in Suisun Bay by exporting organic material by tidal flow from the marsh plain and phytoplankton, zooplankton, and other organisms produced in intertidal channels. There is some evidence that production from the lower Yolo Bypass, including Liberty Slough and Cache Slough marshes, stays relatively intact as it moves down the estuary (Monsen 2003). This production may contribute significantly to the greater foodweb, ultimately benefitting open-water species such as delta smelt and longfin smelt (Brown 2004).*

We believe this last sentence actually refers to Brown 2003[6], as cited in the literature section of the Appendix (there is no reference for "Brown 2004"). If this is correct, the citation suggests a rather serious misrepresentation of Brown (2003), which states:

> *There are few quantitative data to suggest that restoration of tidal wetlands will substantially increase populations of native fishes. On a qualitative basis, there is some support for the idea that tidal wetland restoration will increase populations of some native fishes; however, the species deriving the most benefit from restoration might not be of great management concern at present. Invasion of the San Francisco Estuary by alien plants and animals appears to be a major factor in obscuring the expected link between tidal wetlands and native fishes. Large-scale adaptive management experiments (>100 hectares) appear to be the best available option for determining whether tidal wetlands will provide significant benefit to native fishes [Abstract].*

and

> *Therefore, there is a high degree of uncertainty regarding the benefits of tidal wetland restoration for native fishes, including special status species such as delta smelt (Hypomesus transpacificus), chinook salmon (Oncorhynchus tshawytscha), steelhead rainbow trout (O. mykiss) and splittail (Pogonichthys macrolepidotus)* [Introduction].

and

> *The importance of freshwater tidal wetlands to the native delta smelt is largely speculative.* [section titled "Delta Fresh Water Wetlands"]

Throughout the Brown (2003) manuscript, there is no suggestion that the author endorses the claim attributed to him in Appendix F. Nor is there any mention in Appendix F of this paper's cautionary critique of the EA's favored hypothesis, which is strikingly similar to that of the NRC report on the Delta smelt Biological Opinion (quoted above) that restored shallow water/tidal habitats will support species that occupy open water habitats. Worse, this is not the first time we have pointed out this misrepresentation of Brown (2003) in the context of BDCP[7].

2) The Appendix cites numerous studies in a way that suggests that other researchers support the ideas that (1) food limitation may constrain the abundance of covered species in the Delta and (2) food exported from areas targeted for restoration under BDCP will alleviate that food limitation in a meaningful way. Very often the support implied by these citations is completely non-existent. For example, the current EA Appendix F states:

> *Tidal habitat restoration is expected to increase rearing habitat and/or food resources to be transported to the Delta. Restoration in the Suisun Marsh ROA is*

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[6] Brown.L.R. 2003. Will Tidal Wetland Restoration Enhance Populations of Native Fishes? In: Larry R. Brown, editor. Issues in San Francisco Estuary Tidal Wetlands Restoration. San Francisco Estuary and Watershed Science. Vol. 1, Issue 1 (October 2003), Article 2. http://repositories.cdlib.org/jmie/sfews/vol1/iss1/art2

[7] *See* Letter to BDCP Steering Committee. December 20, 2009 from The Bay Institute, Defenders of Wildlife, and Environmental Defense regarding our review of the BDCP Conservation Strategy, Chapter 3.

> *expected to increase rearing habitat area for Chinook salmon, Sacramento splittail, and possibly steelhead (Healey 1991; Siegel 2007) and increase food resources for rearing salmonids (Benigno and Sommer 2008; Kjelson et al. 1982), splittail (Kjelson et al. 1982), delta smelt (Nobriga and Herbold 2008), and longfin smelt (Hobbs et al. 2006; Rosenfield 2008).*

Similar statements and lists of references are offered for each of the other "restoration opportunity areas" (ROA's). Listing the names of eminent scientists next to the assertions in this sentence would lead most readers to conclude that the specific projected benefits of BDCP habitat restoration activities enjoy wide scientific support. In fact, the statement is highly speculative. As noted above, neither the NRC report on the Delta smelt Biological Opinion nor Brown (2003) found much evidence to support the Appendix's expected relationship between habitat restoration and food supplies for open water species. Similarly, the 2009 DRERIP review of similar actions proposed by BDCP concluded in general [p. 8]:

> *The likelihood that restored tidal areas would export zooplankton and insects to provide food for covered species in other areas of the Delta is a function of the size of the restoration area, its relative mix of marsh and open water, its connectivity to the estuary, the amount of riverine influence on the area, and the degree to which production is consumed within the ROA. The evaluation team had difficulty evaluating this outcome and in the end presented alternate conclusions. These different viewpoints reflect a core need to gain better understanding, which can be accomplished most effectively through implementing restoration efforts and evaluating their outcomes on this issue.*

The 2009 DRERIP review concluded that most of the BDCP tidal marsh restoration areas (including Cache Slough and West Delta) would provide: *Expected minimal to low benefits for delta smelt, longfin smelt, sturgeon, steelhead, and salmonids (all runs) with minimal to low certainty*. The Suisun Marsh ROA projects were an exception as the experts behind the DRERIP reviews found [p. 10]: *Expected medium magnitude benefits (minor population level effect) of providing habitats for splittail, delta smelt, and fall and spring-run Chinook salmon, but certainty is minimal to low…* [although] *… benefits* [are] *highly dependent on where within Suisun Marsh the restoration efforts are located.*

Though Appendix F references the 2009 DRERIP evaluations, it does not indicate the low level of support (and high level of uncertainty) presented by this thorough analysis of the hypothesis that tidal marsh restoration will result in improvements to the pelagic food web or expanded rearing habitats for covered species. Furthermore, the Appendix does not analyze the very factors the DRERIP 2009 report states would affect a restored marsh's ability to export food (i.e. size, mix of marsh to open water, connectivity, amount of production consumed onsight, etc.).

Worse, the Appendices references to literature that supposedly support its food-export hypothesis are either irrelevant to this hypothesis, support other hypotheses regarding restoration of covered species food supplies, or contradict the tidal marsh food-export hypothesis. For example, regarding benefits to Chinook salmon and steelhead from use of

BDCP's planned restoration actions in Suisun Marsh, the Appendix references Healey 1991, Benigno and Sommer 2008[8], Kjelson et al. 1982, and Siegel 2007.

- Siegel (2007) is a slide show and we have described before the absurdity of relying on this presentation to support particular restoration actions or their putative impacts on covered species[9];
- Healy (1991) is a 20+-year old book chapter that describes Chinook salmon behavior across the coast throughout their life cycle – it provides no support for the notion that BDCP's proposed restoration of Suisun Marsh habitats will benefit Chinook salmon;
- Kjelson et al (1982; also the source of most of Healy 1991's information about salmon in this system) provides no support for the notion that BDCP's proposed restoration of Suisun Marsh habitats will benefit Chinook salmon. However, this paper does state that [Abstract]:
  - *Survival though the Delta in June is inversely related to water temperature and directly related to river flow…*

  and
  - *Alteration of the timing, magnitude, and distribution of flow in* [this Estuary] *has a major impact on juvenile Chinook survival.*

  Curiously, Kjelson (1982) is not mentioned in Appendix C of the EA, which is supposed to describe the effects of (reduced) freshwater flow resulting from the current BDCP conservation strategy.

There are more recent papers that address the likelihood that Chinook salmon or steelhead will benefit from restoration in Suisun Marsh[10]. For example, The DRERIP Conceptual Model for Central Valley Salmonids (Williams 2009; p. 44) states:

> *For Chinook and steelhead, the importance of estuaries as juvenile rearing habitat varies inversely with the size at which the fish enter the estuaries, as indicated by the review of life history patterns above. … Spring Chinook, or at least the Butte Creek population, pass quickly through the Delta, so habitat restoration there seems unlikely to do much for them. The same is probably true for late fall Chinook, and for steelhead. Fall Chinook, however, probably would benefit strongly from tidal marsh restoration. The case for winter Chinook seems equivocal.* [Emphasis added]

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[8] Benigno and Sommer (2008) is not listed in the references, so it is not possible to evaluate the relevance of this citation.

[9] On December 20, 2009, TBI and its NGO colleagues wrote in a review of the BDCP Conservation Strategy: *"Siegel 2007" is a draft conceptual document that identifies itself as a "starting point" for collaborative visioning. The paper clearly states, "This document is incomplete and not fully vetted" [p. 2]. Not only is the paper not peer-reviewed (probably because it was never meant for publication or citation), it does not cite any references of its own. Although the author of this presentation is a highly respected member of the regional restoration science community and his views carry great weight, this draft paper amounts to opinion (in this case, about the planning process for restoration) and should not be used to substantiate the claims…with which it is associated in Chapter 3.*

[10] Our point is not that habitat restoration in Suisun Marsh is a bad idea – this particular proposal probably has more potential benefits than many of the other habitat restoration projects. Rather, we object to the fact that the Appendix avoids mentioning reputable sources that cast doubt on the hypothesis that physical habitat restorations will work in the manner, to the degree, and with the certainty described. We also reject, the Appendix's practice of implying support for its ideas from sources that do not actually comment on the likelihood of these proposed conservation actions or actually undermine their purported benefits.

The EA Appendix references Williams 2006 to make a different point, but does not mention his published, peer-reviewed, professional judgement that tidal marsh restoration is unlikely to benefit Central Valley salmonids other than fall run Chinook salmon.

The Appendix's citation of literature regarding non-anadromous fish is equally biased. To support its assertion that smelt will benefit from food resources created in restored tidal wetlands, the Appendix cites Nobriga and Herbold (2008, Delta smelt) and Rosenfield (2008, longfin smelt). But these publications' consistency with Appendix F's assertions is questionable at best:

- Whereas, Nobriga and Herbold identify food limitation as a potential limit on Delta smelt populations; they encourage efforts to improve Delta water quality, not tidal marsh restorations, to stimulate the Delta smelt food web. They also emphasize that high water temperatures exacerbate (or may be the root cause of) food limitation; thus, it is surprising that Appendix F (having cited these authors) does not address either of their principle concerns. Nobriga and Herbold (2008) do not mention restoration of Suisun Marsh tidal wetlands as a likely conservation measure;
- Rosenfield (2010 – the citation to 2008 is erroneous) indicates that food limitation may be a problem limiting longfin smelt; however, that conceptual model links longfin smelt food supply to increased winter-spring fresh water Delta outflows, which are strongly correlated with longfin smelt abundance ((Kimmerer 2002; Rosenfield and Baxter 2007; Kimmerer et al 2009) and populations of certain longfin smelt prey items (e.g. *Crangon* shrimp, and spring populations of *Eurytemora* affinis; Kimmerer 2002; Kimmerer et al 2009). The longfin smelt conceptual model does not suggest that tidal marsh restoration (in Suisun Marsh or elsewhere) will benefit longfin smelt, largely because this fish is known to aggregate in deep, open waters (i.e. far from tidal marsh "sources" of food) as soon as they gain the ability to swim and actively pursue prey.

Again, it is surprising that the Appendix does not reference the NRC report's findings regarding tidal marsh restoration and Delta smelt or the 2009 DRERIP review of BDCP's proposed tidal marsh restoration actions.

3) The Appendix largely ignores foreseeable negative impacts of its shallow water habitat restoration proposals or phenomena that would negate their presumed positive effects. For example, restored shallow sub-tidal habitats may become habitat for predatory species, invasive plants (SAV), or non-native clams. The potential for each of these effects was addressed, on a region-by-region basis, in the 2009 DRERIP review of proposed BDCP actions, but these reviews have been largely ignored (*see above*). For instance, Appendix F suggests that sturgeon may benefit from productivity on restored habitats, particularly if that food were to become sequestered by populations of benthic fauna (e.g. clams). The Appendix asserts [p. F-46]: "*… both species of sturgeon may indirectly benefit from the export of food through the Corbula foodweb linkage*".

This is an ironic take on potential "positive" impacts of habitat restoration as many (though not all) experts in the aquatic ecology of the San Francisco ecosystem regard the spread of *Corbula* and *Corbicula* clams as a (potentially large) stressor on food supplies of the covered species. Regarding this issue, the 2009 DRERIP review of BDCP's proposed tidal marsh habitat projects stated [p. 8]:

> *The establishment of Corbicula* [or, elsewhere, *Corbula*] *could limit or eliminate the benefits of the action by consuming increases in primary productivity created by the restored marsh and subtidal* [elsewhere, floodplain] *areas. Uncertainty is high regarding whether this loss of primary production could affect secondary production – zooplankton and insects – that serve as the primary prey items for covered fish species.*

- **Appendix F elevates the food limitation hypothesis to the level of fact without accurate reference to supporting literature, while ignoring other viable hypotheses.**

As elsewhere in the current EA, Appendix F assumes that food limitation is a problem for all of the covered species; documentation in support of this hypothesis is missing, misrepresented, or erroneously cited. For example, the EA states:

> *The published scientific literature strongly supports the conclusion that longfin smelt are food-limited, and a number of studies have described the link between declining food availability and longfin smelt abundance in the Plan Area (Kimmerer 2002; Lopez et al. 2006; Baxter et al. 2008, 2010; Moyle 1996; Glibert 2010; Rosenfield and Baxter 2007).*

The most that can be said of these citations is that they are "consistent" with an hypothesis of food limitation for longfin smelt. For example[11]:

- Rosenfield and Baxter (2007) describe their finding of strong correlation between Delta outflow and longfin smelt abundance over several decades and numerous sampling programs as "consistent with" a food limitation hypothesis. In scientific parlance, "consistent with" means "does not contradict/does not falsify"; this study contained no data on or analysis of food limitation and longfin smelt and certainly does not represent "strong evidence" supporting a food limitation hypothesis. Furthermore, what appendix F does not reveal is that the paper clearly states [p. 1589]: *Some aspects of the longfin smelt decline are not explained by food web changes related to the Amur clam invasion*.
- Kimmerer (2002) also finds that longfin smelt population declines are not inconsistent with an hypothesis that the population is limited by food supply; however, the main finding of this paper was that most of the pelagic fish species' populations studied behaved in a manner that *was inconsistent* with the hypothesis

[11] We will not treat every source cited above due to time and spac e considerations.

that they were limited by sequestration of primary production by the introduced clam, *Corbula amurensis.* Kimmerer wrote [p. 39]:

> *...the variation with freshwater flow of abundance or survival of organisms in higher trophic levels apparently did not occur through upward trophic transfer, since a similar relationship was lacking in most of the data on lower trophic levels.*

We have identified this common misinterpretation of Kimmerer (2002) several times before.

- Lopez et al. (2006) presented results that show that shallow tidal habitat may be net sources *or sinks* of phytoplankton biomass. They do not mention and certainly did not study longfin smelt or Suisun Marsh. As a result, the three main lessons they derive from their research, though extremely important for BDCP as it considers implementing and managing habitat restoration projects, have been ignored in this Appendix. This manuscript does not deal explicitly with *"... the link between declining food availability and longfin smelt abundance"* as advertised by Appendix F.

These and other misrepresentations of the scientific literature call into question the credibility of this and other BDCP documents and, if not corrected, will eventually undermine the credibility of the Resources Agency itself.

For several covered species, the support for a food-limitation hypothesis (much less the hypothesis that each species will benefit from food exported from tidal marshes) is weak. For example, the 2008 DRERIP conceptual models for both white sturgeon and green sturgeon lists "food availability" as a "low importance"[12] stressor of which we have little or no understanding or ability to predict[13]. The same low scores were given to the potential for rearing habitat in the lower river to limit these populations. Appendix F references the green sturgeon DRERIP conceptual model (Israel and Klimley 2008) and white sturgeon DRERIP conceptual model (Israel et al 2008) repeatedly (as it should); so it is highly unusual that the Appendix does not mention that neither model supports a claim of food limitation on juvenile sturgeon in the Delta.

Similarly, the Appendix persists with the unsupported assertion that steelhead are behaviorally and ecologically similar to fall run Chinook salmon and that they are thus likely to be food-limited. Appendix F states [p. F-5]:

> ***Modifications to the Yolo Bypass to increase flooding will increase the production of food for rearing of … steelhead*** *… Although there are no observations in the literature concerning steelhead feeding on floodplains, it can be assumed that they are using the same food sources as juvenile salmon given their life-history similarities. Moyle and coauthors (2004) state that stream-dwelling rainbow trout feed mostly on drifting aquatic organisms, terrestrial insects, and bottom-dwelling organisms, which are in abundance on floodplains.*

[12] DRERIP score = 2; defined as, "expected sustained effect limited to small fraction of population, addresses productivity and diversity in a minor way, or limited spatial or temporal habitat effects"
[13] DRERIP score for "understanding" an d for "predictability" = 1

Similar statements are made regarding a set of tidal marsh habitat restoration actions with regard to steelhead [Appendix F, p. F-6].

In fact, migrating steelhead smolt are behaviorally and ecologically different than either juvenile fall-run Chinook salmon or stream-dwelling rainbow trout – the different names applied to these organisms are an acknowledge of the major differences in their life history. Simply put, emigrating steelhead juveniles are much older, larger, and more aggressive than fall run Chinook salmon juvenile migrants. They are piscivorous and likely would prey on fall run Chinook salmon they encounter in restored habitats. Thus, as described in the quote above from the DRERIP Conceptual Model for Central Valley Salmonids (Williams 2009), habitat restoration in the Delta seems "unlikely to do much" for steelhead. The continued assumption that steelhead needs in the San Francisco Estuary watershed are the same as those of fall run Chinook salmon is especially vexing because the DRERIP conceptual models are supposed to form the basis of the BDCP analysis and because we have commented numerous times on the fallacy and potential negative impacts of this substitution[14].

Which brings us to our final point regarding this version of Appendix F and the other recent EA Appendices we have reviewed…

- **Appendix F fails to incorporate, acknowledge, or transparently respond to concerns raised by environmental NGO's, state and federal fish, wildlife, or water management agencies, or independent science reviews.**

As we have stated repeatedly[15],

> *…we continue to be strong supporters of restoring wetland habitats; the point is that there is no basis for assuming that wetland restoration alone will recover many of the species and habitats most affected by water project operations.*

As evidenced in our review of EA Appendices A, B, C, D, and F, the BDCP Conservation Strategy still relies almost exclusively on the putative benefits of proposed habitat restoration projects to: (1) mitigate for the highly likely negative impacts of further impaired freshwater flow conditions projected under the BDCP operational regime, and (2) contribute to recovery of the covered aquatic species. In doing so, the BDCP continues to ignore the best scientific evidence, which may be summarized by the SWRCB [2010]:

> *Recent Delta flows are insufficient to support native Delta fishes for today's habitats. ... Flow and physical habitat interact in many ways, <u>but they are not interchangeable</u>* [SWRCB 2010, emphasis added]

As we have noted several times before, it is indefensible that the BDCP projects reduced Sacramento River flows and Delta outflows (with no increase of the dismal flows in the San Joaquin River) that we know (and the EA confirms) will have negative impacts to covered species while arguing that these negative impacts can be more than offset by habitat restoration

[14] See again, our December 20, 2009 letter re: the Chapter 3 Conservation Strategy and our April 4, 2011 memo reviewing an earlier version of the BDCP EA.
[15] Quoting here from our September 2011 performance evaluation of BDCP .

projects that will require decades to plan, permit, implement, and evolve. And, it is completely unacceptable to manipulate, distort, and ignore the best available science (including experts convened by BDCP) in an effort to defend this unsubstantiated speculation. Such repeated abuse of the available science has undermined the credibility of the process used to develop both the Conservation Strategy and its Effects Analysis. In the face of these two foundational issues, the fact that BDCP continues to ignore our best efforts to improve the substance of its technical documents and the process used to develop them calls into question the stated intention of Plan proponents to develop a credible, science-based plan. The continued lack of scientifically (and/or logically) credible analysis certainly undermines the State's ability to approve and implement what is already a very costly and controversial project.

The Path Forward

We and our NGO colleagues have previously described a pathway for implementing the BDCP Logic Chain through a collaborative DRERIP-like, iterative process that will lead to three major products the BDCP currently lacks:

(1) a credible Conservation Strategy based on the best available science and comprehensive treatment of all stressors in the Delta that humans control;

(2) an Effects Analysis that documents the magnitude of and timeline for positive and negative impacts that may be anticipated from implementation of the Conservation Strategy as well as the related uncertainty of these effects; and

(3) a strong, durable, transparent, and science-based Adaptive Management process that will enable adjustments to Plan activities as we learn more about what works and what does not work in the original plan.

There is no reason to believe that the process we have outlined will take longer or cost more than producing an EA in the consultant-centric manner that has already been attempted several times; in fact, we believe it could take less time and cost less money. In any case, money and time spent producing unsound products that are supposed to be the building blocks for 50-year water diversion permit is not justifiable. Therefore, TBI urges you to restructure BDCP's process for developing, analyzing, and refining the conservation strategy, EA, and adaptive management program using the Logic Chain and a DRERIP-like review process; pushing forward with the inadequate products that have been developed to date (e.g. rolling up the existing Appendices into a cumulative EA) will not lead to a successful Bay Delta Conservation Plan.